

PERSONALISED MEDICINE : THE INDIAN SCENARIO

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ABSTRACT

Advancements with emerging human genome structure calls for a better understanding about genomics and in developing new therapeutic approaches and creating a revolution in the way medicine is practiced ⁽¹⁾. Personalised medicine refers to the process of tailoring the medical decisions, interventions and treatment patterns for an individual patient in order to increase the probability of desired outcomes ⁽²⁾. With the completion of the human genome project, sequencing an individual's genome is made possible rendering it a major breakthrough in the history of medicine, creating a more targeted approach in the treatment, detection of biomarkers for predictive diagnosis and prevention of diseases. Personalised medicine in India is a new and up-coming field with faster progress being made day-by-day. Many companies in India have made the efforts to initiate the process of genetic/genomic sequencing.

Despite the optimism expressed, a lot of factors intervene with the process of personalised medicine becoming a success and being implemented into the healthcare system of India. The health insurance system, the capital allowance in research and development, scarcity of institutions and regulatory authorities are to name a few ⁽³⁾. With the increased usage of the sequencing technology, the prices involved have escalated to a level of unaffordability. Drug repurposing or drug repositioning is crucial in order to provide the quickest possible transition from bench to bedside. Repurposing is the use of already existing drugs and compounds for the treatment of new indications or diseases ⁽⁴⁾. Changes in healthcare systems and in the insurance policies need to be made in order to adopt the practise of personalised medicine.

The above issues can be addressed by educational activities, improved funding, reforming regulatory bodies and improving collaborations between the concerned authorities and the caregivers ⁽⁵⁾. Attending to these issues resolves the hurdles in the path of personalised medicine ameliorating the healthcare system of India.

INTRODUCTION

The never ending quest for newer agents signals a new era of medical expansion. Sequencing of an individual's genome has made it possible to develop tailor-made therapy efficacious in the treatment of many conditions like infectious diseases, cancer, etc.

THE NEED FOR PRECISION MEDICINE:

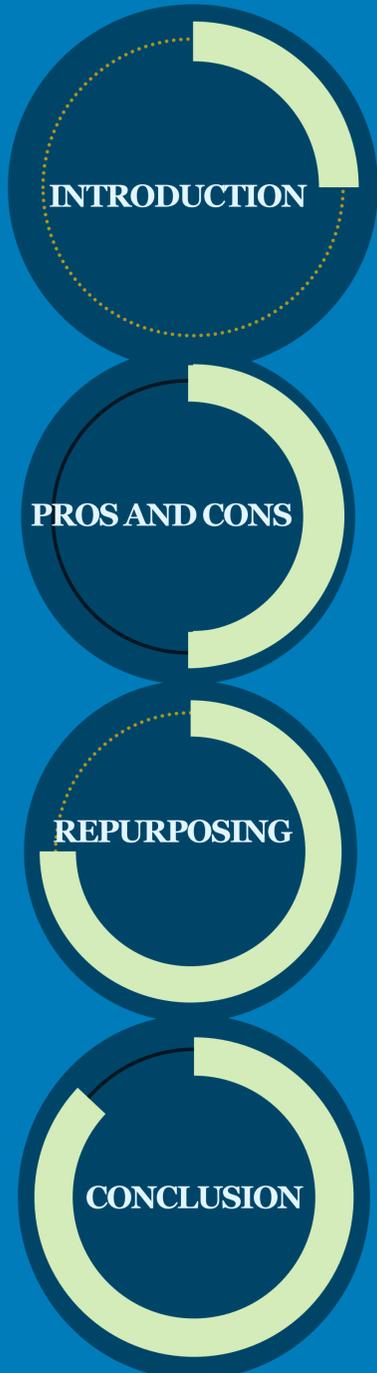
- Increasing cost of the conventional agents,
- Large ADR profile and drug toxicities,
- Poor drug tolerance,
- Ineffectiveness and failure of conventional drugs,
- Increasing mortality rate with treatment.

DEATHS FROM DISEASES ACROSS COUNTRIES

Age-standardized mortality rates by causes
(per 100 000 population)

	Communicable diseases	Non communicable diseases
Germany	22	365
UK	29	359
US	31	413
Japan	34	244
China	41	576
Turkey	44	555
Mexico	58	468
Maldives	59	487
Russian Federation	74	790
Sri Lanka	75	501
Brazil	93	514
Malaysia	117	563
Indonesia	162	680
Global average	178	539
Bangladesh	235	549
Nepal	252	678
India	253	682
Pakistan	296	669
Myanmar	316	709
Afghanistan	363	846
South Africa	612	711

Source: NSSO, WHO



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PROS^{(6),(7)}

- + Targeted therapy - exploits specific gene, mutation, protein or pathway,
- + Higher efficacy – trial-and-error methods are avoided,
- + Absence of conventional side effects – does not affect healthy parts,
- + Better QoL – better prognosis,
- + Disease risk assessment – protective and risk factors are known ahead of time,
- + Early diagnosis – detection at initial stages,
- + New diagnosis – Previously unknown diseases can be identified,
- + Reduced costs – decreased co-morbidities, recurrent hospitalization.

The 4 P's of Personalized Medicine

1

PRECISE DIAGNOSIS

2

PREDICTION OF RISK FACTORS

3

PERSONALISED AND TARGETED THERAPY

4

PREVENTION OF DRUG MEDIATED TOXICITIES

CONS^{(6),(7)}

- Lack of insurance – Not mandatory, as a result majority remains uninsured,
- Decreased capital allowance - investment into the healthcare sector is lower,
- Tedious and expensive process - development of targeted drugs is exhaustive an expensive,
- Manufacturing costs – Making the drugs maybe costlier,
- Scarcity of institutions and regulatory bodies regarding target therapies,
- Ethical considerations – Violation of privacy and confidentiality ; genetic discrimination,
- Intellectual property rights – Drugs can not be simply patented based on structures; data exclusivity is sought.

PROS AND CONS OF PERSONALISED MEDICINE IN INDIA

INTRODUCTION

PROS AND CONS

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REPURPOSING/ REPROFILING/REPOSITIONING⁽⁷⁾

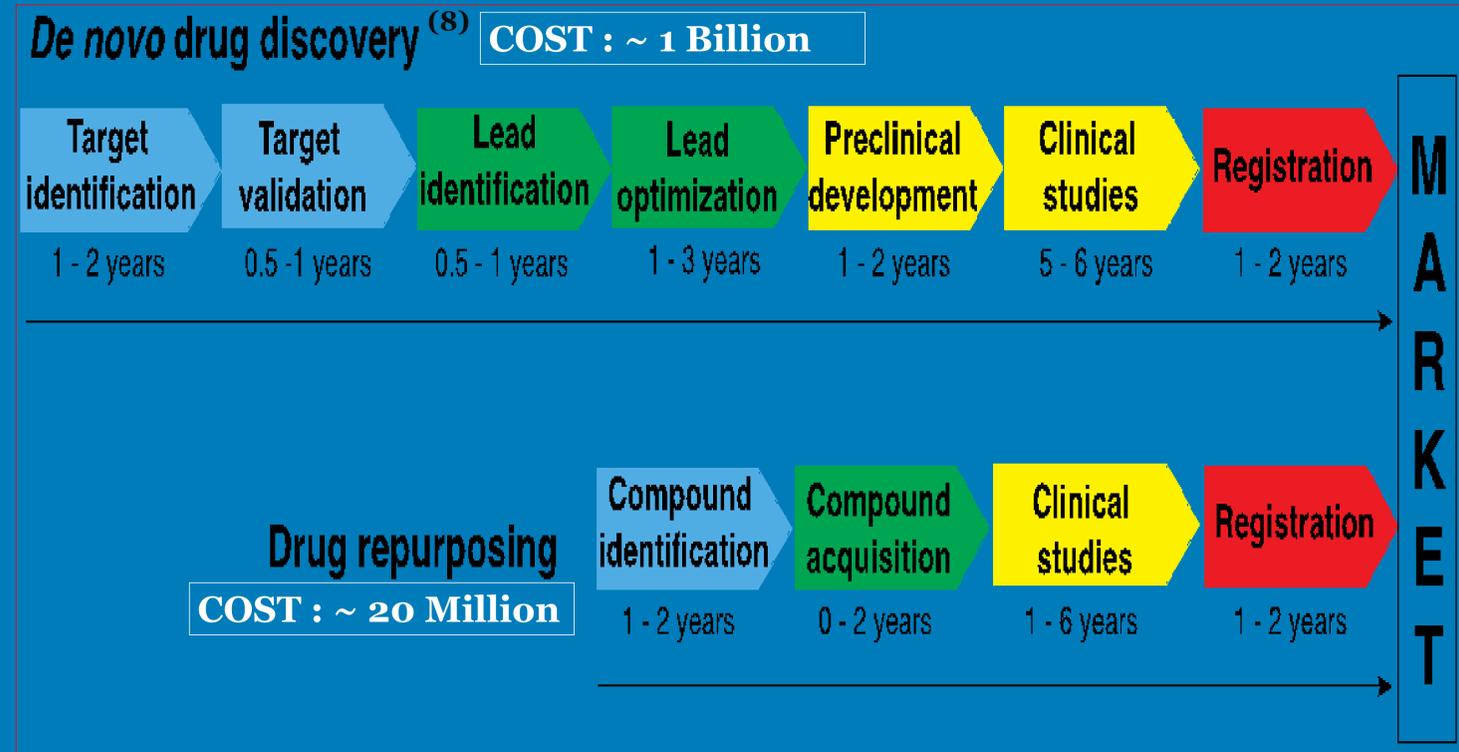
- ✓ Method where existing drugs are used for other indications,
- ✓ Best solution considering the Indian scenario,
- ✓ Enables faster transition from bench research to bedside treatment,
- ✓ Advantage – the safety profile and risks are known as already undergone toxicity screening , thereby decreasing failure due to adverse effects,
- ✓ Specifically useful in cases where reserve drugs are exhausted, unaffordable medications, existing drugs no longer meet patient needs,
- ✓ Implemented in various fields such as – cancer, infectious disease, psychiatry medicine, autoimmune drugs, etc.
- ✓ ReDo Project - international collaboration of researchers, working non-profitably, aiming to achieve new indications for already existing, well characterized drugs that can be effective in cancer treatment with low adverse profiles and higher affordability rate.

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EXAMPLES

Aspirin	Amphotericin B	Diclofenac
Thalidomide	Bromocriptine	Clarithromycin
Minoxidil	Gemcitabine	Nitroglycerin
Finasteride	Doxycycline	Mebendazole
Sildenafil	Chloroquine	Metformin
Raloxifene	Dexamethasone	Naltrexone
Methotrexate	Itraconazole	Rituximab

REPURPOSING OF DRUGS

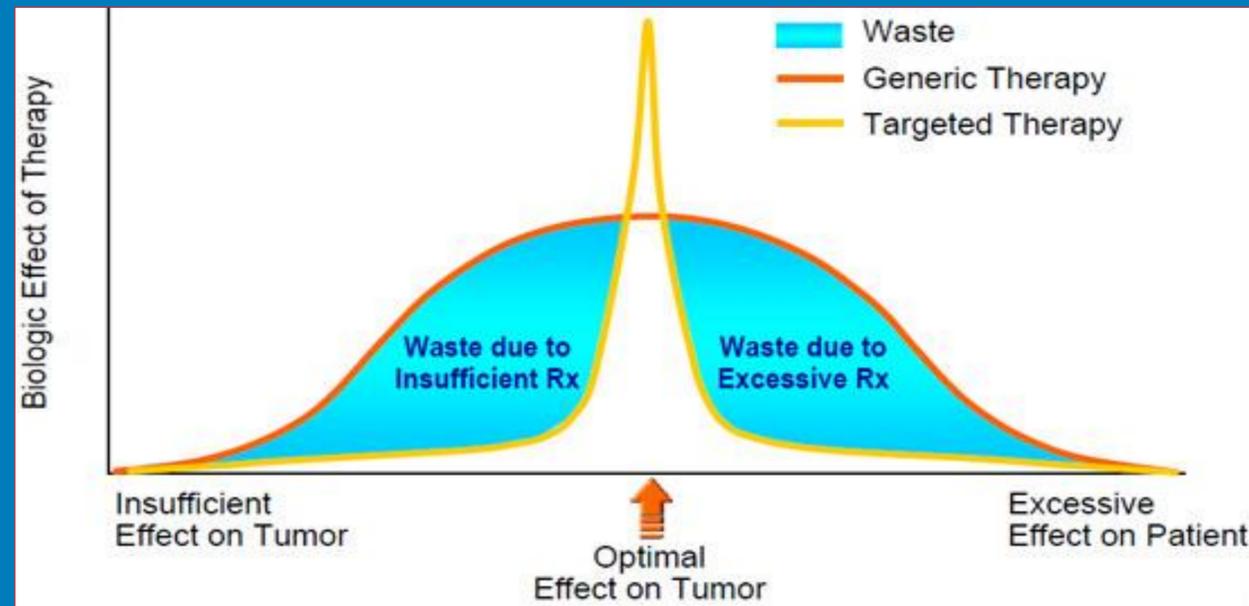
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IMPORTANCE OF PRECISION MEDICINE⁽⁹⁾



CONCLUSION

- Personalized medicine is something that every individual must have access to in-order for healthcare to mark its prominence.
- Many changes in the healthcare system need to be brought about to fit targeted therapy into medical practice,
- Educational activities, increased research funding, reforming regulatory bodies, improving collaborations between caregivers and concerned authorities are to name a few,
- With repurposing being the newest alternative , government funded projects could ignite the use of existing drugs for new indications ameliorating the current trends in medicine.

END GOAL



PATIENT CARE



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CONCLUSIONS AND REFERENCES

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